

IN THE CLAIMS:

Please CANCEL claims 33 and 34 without prejudice to or disclaimer of the recited subject matter.

Please AMEND claims 18, 28, 30 and 32, as follows. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1-10. (Cancelled)

11. (Withdrawn) A semiconductor device manufacturing method comprising the steps of:
installing manufacturing apparatuses comprising an optical system having a plurality of spaces and a mechanism that fills each of the spaces with a gas, a gas contained at least in one of the plurality of spaces has a refractive index different from that of a gas contained at least in one of the remaining spaces, and a pressure of the gas at least in the one of the plurality of spaces is different from that of the gas at least in the one of the remaining spaces; and
manufacturing a semiconductor device in a plurality of processes by using the manufacturing apparatuses.

12. (Withdrawn) The method according to claim 11, further comprising the steps of
connecting the manufacturing apparatuses by a local area network, and
communicating information about at least one of the manufacturing apparatuses between the local area network and an external network of the semiconductor manufacturing factory.

13. (Withdrawn) The method according to claim 12, wherein maintenance information of the manufacturing apparatus is acquired by data communication by accessing a database provided by a vendor or user of the exposure apparatus via the external network, or production is managed by data communication via the external network with a semiconductor manufacturing factory other than the semiconductor manufacturing factory.

14. (Withdrawn) A semiconductor manufacturing factory comprising:
manufacturing apparatuses for various processes, including an exposure apparatus comprising an optical system having a plurality of spaces and a mechanism that fills each of the spaces with a gas, a gas contained at least in one of the plurality of spaces has a refractive index different from that of a gas contained at least in one of the remaining spaces, and a pressure of the gas at least in the one of the plurality of spaces is different from that of the gas at least in the one of the remaining spaces;

a local area network for connecting said manufacturing apparatuses; and
a gateway for allowing the local area network to access an external network of said factory,

wherein information about at least one of said manufacturing apparatuses is communicated by connection to the external network.

15. (Withdrawn) A maintenance method for an exposure apparatus installed in a semiconductor manufacturing factory and comprising an optical system having a plurality of spaces and a mechanism that fills each of the spaces with a gas, a gas contained at least in one of the plurality of spaces has a refractive index different from that of a gas contained at least in one of the remaining spaces, and a pressure of the gas at least in the one of the plurality of spaces is different from that of the gas at least in the one of the remaining spaces, comprising the steps of:

causing a vendor or user of the exposure apparatus to provide a maintenance database connected to an external network of the semiconductor manufacturing factory;

authenticating access from the semiconductor manufacturing factory to the maintenance database via the external network; and

transmitting maintenance information accumulated in the maintenance database to the semiconductor manufacturing factory via the external network.

16. (Withdrawn) An exposure apparatus comprising an optical system having a plurality of spaces and a mechanism that fills each of the spaces with a gas, a gas contained at least in one of the plurality of spaces has a refractive index different from that of a gas contained at least in one of the remaining spaces, and a pressure of the gas at least in the one of the plurality of spaces is different from that of the gas at least in the one of the remaining spaces, comprising:

a display;

a network interface; and

a computer for executing network software,

wherein maintenance information to the exposure apparatus is communicated via a computer network.

17. (Withdrawn) The apparatus according to claim 16, wherein the network software is connected to an external network of a factory where the exposure apparatus is installed, provides on said display a user interface for accessing a maintenance database provided by a vendor or user of the exposure apparatus, and enables obtaining information from the database via the external network.

18. (Currently Amended) An exposure apparatus comprising:

a projection optical system for projecting a pattern formed on a mask, onto an object to be exposed, which projection optical system has a plurality of optical elements, wherein said projection optical system has a first space enclosed with two optical elements of the plurality of optical elements and filled with a helium gas, and a second space enclosed with two optical elements of the plurality of optical elements and filled with a nitrogen gas,

wherein a pressure of the first space is higher than that of the second space.

19. (Previously Presented) The apparatus according to claim 18, wherein the first and second spaces are adjacent to each other.

20. (Previously Presented) The apparatus according to claim 19, wherein the first and second spaces are adjacent to each other via an optical element.

21. (Previously Presented) The apparatus according to claim 18, wherein the pressure difference between the first and second spaces is not more than 1,000 Pa.

22. (Previously Presented) The apparatus according to claim 18, further comprising:

a helium gas supply means for supplying the helium gas into the first space;

a first exhaust means for exhausting an internal gas of the first space;

a nitrogen gas supply means for supplying the nitrogen gas into the second space; and

a second exhaust means for exhausting an internal gas of the second space.

23. (Previously Presented) The apparatus according to claim 18, further comprising a projection optical system for projecting exposure light from a pattern to an object to be exposed, wherein the first and second spaces are formed in the projection optical system.

24. (Previously Presented) The apparatus according to claim 18, wherein the first space is substantially closed except for an opening portion of the helium gas supply means and the first exhaust means.

25. (Previously Presented) The apparatus according to claim 24, further comprising:
a detection unit which detects the pressure of the first space; and
an operation unit which operates the pressure of the first space based on the detection result of the detection unit.

26. (Previously Presented) The apparatus according to claim 18, wherein the second space is substantially closed except for an opening portion of the nitrogen gas supply means and the second exhaust means.

27. (Previously Presented) The apparatus according to claim 26, further comprising:
a detection unit which detects the pressure of the second space; and
an operation unit which operates the pressure of the second space based on the detection result of the detection unit.

28. (Currently Amended) A device manufacturing method comprising:
exposing an object by using an exposure apparatus which comprises a projection optical system for projecting a pattern formed on a mask, onto the object to be exposed, which projection optical system has a plurality of optical elements, the projection optical system having a first space enclosed with two optical elements of the plurality of optical elements and filled with a helium gas and a second space enclosed with two optical elements of the plurality of

optical elements and filled with a nitrogen gas, with a pressure of the first space being higher than that of the second space; and

developing the exposed object.

29. (Previously Presented) The apparatus according to claim 18, further comprising a support structure which supports the plurality of optical elements, wherein said first and second spaces are disposed inside the support structure.

30. (Currently Amended) An exposure apparatus comprising:

a projection optical system for projecting light from a pattern formed on a mask illuminated by using a light source, onto an object to be exposed, which projection optical system has a plurality of first, second and third optical elements;

~~a first space enclosed with two optical elements of the plurality of optical elements and filled with a helium gas;~~

~~a second space enclosed with two optical elements of the plurality of optical elements and filled with a nitrogen gas, wherein a pressure of the nitrogen gas in the second space is lower than that of the helium gas of the first space;~~

first supply means for supplying ~~the~~ a helium gas to ~~the~~ a first space, which is contained by the first optical element and the second optical element;

first exhaust means for exhausting an atmosphere of the first space;

second supply means for supplying ~~the~~ a nitrogen gas to ~~the~~ a second space, which is contained by the second optical element and the third optical element; and

second exhaust means for exhausting an atmosphere of the second space,

wherein a pressure of the helium gas in the first space is higher than a pressure of the nitrogen gas in the second space.

31. (Previously Presented) The apparatus according to claim 30, further comprising a support structure which supports the plurality of optical elements, wherein said first and second spaces are disposed inside the support structure.

32. (Currently Amended) A device manufacturing method comprising:

exposing an object by using an exposure apparatus which comprises a projection optical system for projecting light from a pattern formed on a mask illuminated by using a light source, onto an object to be exposed, which projection optical system has ~~a plurality of first, second and third~~ optical elements, ~~a first space enclosed with two optical elements of the plurality of optical elements and filled with a helium gas, a second space enclosed with two optical elements of the plurality of optical elements and filled with a nitrogen gas, wherein a pressure of the nitrogen gas in the second space is lower than that of the helium gas of the first space,~~ first supply means for supplying ~~the~~ a helium gas to ~~the~~ a first space, which is contained by the first optical element and the second optical element, first exhaust means for exhausting an atmosphere of the first space, second supply means for supplying ~~the~~ a nitrogen gas to ~~the~~ a

second space, which is contained by the second optical element and the third optical element, and
second exhaust means for exhausting an atmosphere of the second space, wherein a pressure of
the helium gas in the first space is higher than a pressure of the nitrogen gas in the second space;
and

developing the exposed object.

33 and 34. (Cancelled)